Syllabus

Methods of Cognitive Science

CSCI 340
Spring 2022

Tuesdays and Thursdays 1:00 PM – 2:15 PM
Online, then Provisional Campus Facility (PCF) "Tent" 3

Instructor: Bartlett D. Moore IV, PhD
email: bart4@rice.edu
website: http://bart.rice.edu/
office hours: By appointment, see http://bart.rice.edu/appointments/

Course overview

Catalog Description:

Cognitive science is a basic science of mental operations in humans, animals, and artificial systems. It is a highly interdisciplinary endeavor that draws on philosophy, psychology, biology, linguistics, and computer science, among other traditional disciplines. This course provides an integrated introduction to the primary empirical methods for studying the human mind. Students will learn how the scientific method is applied to study mental information representation, manipulation, and utilization in natural and artificial cognitive systems. It will teach students to understand existing methodological approaches and recognize what is necessary to replicate results. Topics will include the philosophical foundations of cognitive science, basic methods of cognitive psychology, neuroscience, linguistics, computational modeling, data analysis, and ethical responsibility when conducting cognitive research.

- 3 Credit Hours, CRN 23619

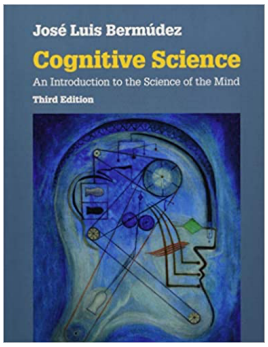
Student Learning Outcomes:

- Learn how the scientific method can be applied to understand mental operations
- Evaluate the merits and limitations of the major cognitive research methodologies
- Synthesize results from complementary methodologies to develop new theories of cognition
- Describe experimental methods in enough detail to replicate results
- Approach the enterprise of cognitive science logically, systematically, and ethically

Course requirements

Optional Textbook:

Cognitive Science: An Introduction to the Science of the Mind (3rd Edition)
by José Luis Bermúdez, Cambridge University Press
ISBN-10: 1108440347 **ISBN-13:** 978-1108440349



Participation:

- Attend class
- Participate in discussions and group lab assignments
- Complete all peer reviews on time
- Participate in a classroom scientific poster session.

Assignments:

- This course is modeled after how actual cognitive scientists operate. Since we lack the wherewithal to conduct actual research, you will instead consider in depth a thought experiment of your own choosing, including a real literature review, hypothesis, and mock results.
    - Mock research abstract (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3732725/)
    - Mock scientific poster (https://guides.nyu.edu/posters)
    - Mock scientific article manuscript with Introduction, Methods, Results, Discussion sections and Figures with Figure Legends
        - Peer review of three abstracts & manuscripts
        - Revision of your own manuscripts based on peer reviews "Reply-to-reviewers"
- Several in class labs / exercises

Examinations:

- Midterm Exam and Comprehensive Final Exam

Grade Policies:

Final grades are calculated as follows:

Graded items	Weight
Abstract	10%
Poster	20%
Research manuscript	20%
Peer Reviews	10%
Manuscript revision	10%
Midterm Exam	15%
Final Exam	15%
Total:	*100%*

Weighted average	Letter Grade
90-100%	A
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
67-69%	D+
63-66%	D
60-62%	D-
Below 60%	F

Course policies:

Absence policies:

- Attendance is expected either online or face-to-face
- Lecture slides are not intended as a substitute for attending class
- Makeup work will only be accepted if the student informs the instructor *in writing, in advance*
- Reasonable accommodations will be made to allow students to observe religious holidays and University activities such as athletic competitions without jeopardizing academic obligations. However, students are expected to inform the instructor about potential absences.

Rice Honor Code:

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Disability / Special Needs Statement:

If you have a documented disability on file with Disability Resource Center disability that may affect academic performance, you should contact me as soon as possible so we can make arrangements.

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Course Schedule

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Tuesdays and Thursdays 1:00 PM – 2:15 PM

Week	Topic	Optional Readings	Event
Week 1	Introduction & Background	0.1-0.3	Choose a topic!
Week 2	Philosophical foundations & History	1.1-1.4	Literature searches!
Week 3	Psychology: Experimental design		Abstracts due
Week 4	Psychology: Advanced approaches		Abstract reviews due
Week 5	Neuroscience: The damaged brain	5.1, 5.2, 5.3,10.3	
Week 6	Neuroscience: Electrophysiology	9.2, 9.3	Mock poster due
Week 7	Neuroscience: Non-invasive Imaging		Poster session!
Week 8	Methods of Linguistics	1.3, 4, 10.1, 10.2	
Week 9	Methods of Anthropology		**Midterm Exam**
Week 10	Computing: Artificial Neural Networks	5.4	
Week 11	Computing: Artificial Neural Networks	12.1-12.3	Mock paper due
Week 12	Computing: Machine learning		
Week 13	Computing: Analysis, Statistics, Bayes	7.1, 7.2. 10.4	**Peer reviews due**
Week 14	Computing: other		
Week 15	Ethical conduct in CogSci & technology	To be distributed	Paper revisions due
Finals Week	Comprehensive Final Exam		**Final Exam**

Syllabus subject to change:

The information contained in this course syllabus is intended as a *guide* for course conduct. Because this class in still being developed and due to the ongoing global pandemic, specific details, with the exception of the absence policies, may be subject to change.

Notes

- Some course exercises use Matlab Online. You will need to make a MathWorks account to use the software through Rice University's site-wide license:
  - https://www.mathworks.com/academia/tah-portal/rice-university-40580441.html
- Consider scheduling a one-on-one meeting with Dr. Moore to discuss topics for your semester-long thought experiment:
  - http://bart.rice.edu/appointments/

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